

OXFORD HANDBOOKS IN LINGUISTICS

Recently published

THE OXFORD HANDBOOK OF LANGUAGE POLICY AND
PLANNING

Edited by James W. Tollefson and Miguel Pérez-Milans

THE OXFORD HANDBOOK OF PERSIAN LINGUISTICS

Edited by Anousha Sedighi and Pouneh Shabani-Jadidi

THE OXFORD HANDBOOK OF ENDANGERED LANGUAGES

Edited by Kenneth L. Rehg and Lyle Campbell

THE OXFORD HANDBOOK OF ELLIPSIS

Edited by Jeroen van Craenenbroeck and Tanja Temmerman

THE OXFORD HANDBOOK OF LYING

Edited by Jörg Meibauer

THE OXFORD HANDBOOK OF TABOO WORDS AND LANGUAGE

Edited by Keith Allan

THE OXFORD HANDBOOK OF MORPHOLOGICAL THEORY

Edited by Jenny Audring and Francesca Masini

THE OXFORD HANDBOOK OF REFERENCE

Edited by Jeanette Gundel and Barbara Abbott

THE OXFORD HANDBOOK OF EXPERIMENTAL SEMANTICS AND
PRAGMATICS

Edited by Chris Cummins and Napoleon Katsos

THE OXFORD HANDBOOK OF EVENT STRUCTURE

Edited by Robert Truswell

THE OXFORD HANDBOOK OF LANGUAGE ATTRITION

Edited by Monika S. Schmid and Barbara Köpke

THE OXFORD HANDBOOK OF LANGUAGE CONTACT

Edited by Anthony P. Grant

THE OXFORD HANDBOOK OF NEUROLINGUISTICS

Edited by Greig I. de Zubicaray and Niels O. Schiller

THE OXFORD HANDBOOK OF ENGLISH GRAMMAR

Edited by Bas Aarts, Jill Bowie, and Gergana Popova

THE OXFORD HANDBOOK OF AFRICAN LANGUAGES

Edited by Rainer Vossen and Gerrit J. Dimmendaal

THE OXFORD HANDBOOK OF NEGATION

Edited by Viviane Déprez and M. Teresa Espinal

THE OXFORD HANDBOOK OF LANGUAGE PROSODY

Edited by Carlos Gussenhoven and Aoju Chen

For a complete list of Oxford Handbooks in Linguistics please see pp. 893–896.

THE OXFORD HANDBOOK OF

LANGUAGE
PROSODY

Edited by

CARLOS GUSSENHOVEN

and

AOJU CHEN

OXFORD
UNIVERSITY PRESS

OXFORD
UNIVERSITY PRESS

Great Clarendon Street, Oxford, ox2 6DP,
United Kingdom

Oxford University Press is a department of the University of Oxford.
It furthers the University's objective of excellence in research, scholarship,
and education by publishing worldwide. Oxford is a registered trade mark of
Oxford University Press in the UK and in certain other countries

© editorial matter and organization Carlos Gussenhoven and Aoju Chen 2020
© the chapters their several contributors 2020

The moral rights of the authors have been asserted

First Edition published in 2020

Impression: 1

All rights reserved. No part of this publication may be reproduced, stored in
a retrieval system, or transmitted, in any form or by any means, without the
prior permission in writing of Oxford University Press, or as expressly permitted
by law, by licence or under terms agreed with the appropriate reprographics
rights organization. Enquiries concerning reproduction outside the scope of the
above should be sent to the Rights Department, Oxford University Press, at the
address above

You must not circulate this work in any other form
and you must impose this same condition on any acquirer

Published in the United States of America by Oxford University Press
198 Madison Avenue, New York, NY 10016, United States of America

British Library Cataloguing in Publication Data
Data available

Library of Congress Control Number: 2020937413

ISBN 978-0-19-883223-2

Printed and bound by
CPI Group (UK) Ltd, Croydon, CR0 4TY

Links to third party websites are provided by Oxford in good faith and
for information only. Oxford disclaims any responsibility for the materials
contained in any third party website referenced in this work.

CONTENTS

<i>Acknowledgements</i>	xi
<i>List of Figures</i>	xiii
<i>List of Tables</i>	xxii
<i>List of Maps</i>	xxv
<i>List of Abbreviations</i>	xxvii
<i>About the Contributors</i>	xxxv
1. Introduction	1
CARLOS GUSSENHOVEN AND AOJU CHEN	
PART I FUNDAMENTALS OF LANGUAGE PROSODY	
2. Articulatory measures of prosody	15
TAEHONG CHO AND DORIS MÜCKE	
3. Fundamental aspects in the perception of f_0	29
OLIVER NIEBUHR, HENNING REETZ, JONATHAN BARNES, AND ALAN C. L. YU	
PART II PROSODY AND LINGUISTIC STRUCTURE	
4. Tone systems	45
LARRY M. HYMAN AND WILLIAM R. LEBEN	
5. Word-stress systems	66
MATTHEW K. GORDON AND HARRY VAN DER HULST	
6. The Autosegmental-Metrical theory of intonational phonology	78
AMALIA ARVANITI AND JANET FLETCHER	
7. Prosodic morphology	96
JOHN J. MCCARTHY	

8. Sign language prosody 104
 WENDY SANDLER, DIANE LILLO-MARTIN, SVETLANA DACHKOVSKY,
 AND RONICE MÜLLER DE QUADROS

PART III PROSODY IN SPEECH PRODUCTION

9. Phonetic variation in tone and intonation systems 125
 JONATHAN BARNES, HANSJÖRG MIXDORFF, AND OLIVER NIEBUHR
10. Phonetic correlates of word and sentence stress 150
 VINCENT J. VAN HEUVEN AND ALICE TURK
11. Speech rhythm and timing 166
 LAURENCE WHITE AND ZOFIA MALISZ

PART IV PROSODY ACROSS THE WORLD

12. Sub-Saharan Africa 183
 LARRY M. HYMAN, HANNAH SANDE, FLORIAN LIONNET,
 NICHOLAS ROLLE, AND EMILY CLEM
13. North Africa and the Middle East 195
 SAM HELLMUTH AND MARY PEARCE
14. South West and Central Asia 207
 ANASTASIA KARLSSON, GÜLİZ GÜNEŞ, HAMED RAHMANI,
 AND SUN-AH JUN
15. Central and Eastern Europe 225
 MACIEJ KARPIŃSKI, BISTRA ANDREBEVA, EVA LIINA ASU,
 ANNA DAUGAVET, ŠTEFAN BEŇUŠ, AND KATALIN MÁDY
16. Southern Europe 236
 MARIAPAOLA D'IMPERIO, BARBARA GILI FIVELA, MARY BALTAZANI,
 BRECHTJE POST, AND ALEXANDRA VELLA
17. Iberia 251
 SÓNIA FROTA, PILAR PRIETO, AND GORKA ELORDIETA
18. Northwestern Europe 271
 TOMAS RIAD AND JÖRG PETERS

19. Intonation systems across varieties of English 285
 MARTINE GRICE, JAMES SNEED GERMAN, AND PAUL WARREN
20. The North Atlantic and the Arctic 303
 KRISTJÁN ÁRNASON, ANJA ARNHOLD, AILBHE NÍ CHASAIDE,
 NICOLE DEHÉ, AMELIE DORN, AND OSAHITO MIYAOKA
21. The Indian subcontinent 316
 ADITI LAHIRI AND HOLLY J. KENNARD
22. China and Siberia 332
 JIE ZHANG, SAN DUANMU, AND YIYA CHEN
23. Mainland South East Asia 344
 MARC BRUNELLE, JAMES KIRBY, ALEXIS MICHAUD, AND
 JUSTIN WATKINS
24. Asian Pacific Rim 355
 SUN-AH JUN AND HARUO KUBOZONO
25. Austronesia 370
 NIKOLAUS P. HIMMELMANN AND DANIEL KAUFMAN
26. Australia and New Guinea 384
 BRETT BAKER, MARK DONOHUE, AND JANET FLETCHER
27. North America 396
 GABRIELA CABALLERO AND MATTHEW K. GORDON
28. Mesoamerica 408
 CHRISTIAN DICANIO AND RYAN BENNETT
29. South America 428
 THIAGO COSTA CHACON AND FERNANDO O. DE CARVALHO

PART V PROSODY IN COMMUNICATION

30. Meanings of tones and tunes 443
 MATTHIJS WESTERA, DANIEL GOODHUE, AND CARLOS
 GUSSENHOVEN
31. Prosodic encoding of information structure: A typological
 perspective 454
 FRANK KÜGLER AND SASHA CALHOUN

32. Prosody in discourse and speaker state 468
 JULIA HIRSCHBERG, ŠTEFAN BEŇUŠ, AGUSTÍN GRAVANO, AND
 RIVKA LEVITAN
33. Visual prosody across cultures 477
 MARC SWERTS AND EMIEL KRAHMER
34. Pathological prosody: Overview, assessment, and treatment 486
 DIANA VAN LANCKER SIDTIS AND SEUNG-YUN YANG

PART VI PROSODY AND LANGUAGE PROCESSING

35. Cortical and subcortical processing of linguistic pitch patterns 499
 JOSEPH C. Y. LAU, ZILONG XIE, BHARATH CHANDRASEKARAN, AND
 PATRICK C. M. WONG
36. Prosody and spoken-word recognition 509
 JAMES M. MCQUEEN AND LAURA DILLEY
37. The role of phrase-level prosody in speech production
 planning 522
 STEFANIE SHATTUCK-HUFNAGEL

PART VII PROSODY AND LANGUAGE ACQUISITION

38. The acquisition of word prosody 541
 PAULA FIKKERT, LIQUAN LIU, AND MITSUHIKO OTA
39. Development of phrase-level prosody from infancy to
 late childhood 553
 AOJU CHEN, NÚRIA ESTEVE-GIBERT, PILAR PRIETO, AND
 MELISSA A. REDFORD
40. Prosodic bootstrapping 563
 JUDIT GERVAIN, ANNE CHRISTOPHE, AND REIKO MAZUKA
41. Prosody in infant- and child-directed speech 574
 MELANIE SODERSTROM AND HEATHER BORTFELD

42. Prosody in children with atypical development 582
 RHEA PAUL, ELIZABETH SCHOEN SIMMONS, AND JAMES MAHSHIE
43. Word prosody in second language acquisition 594
 ALLARD JONGMAN AND ANNIE TREMBLAY
44. Sentence prosody in a second language 605
 JÜRGEN TROUVAIN AND BETTINA BRAUN
45. Prosody in second language teaching: Methodologies
 and effectiveness 619
 DOROTHY M. CHUN AND JOHN M. LEVIS

PART VIII PROSODY IN TECHNOLOGY AND THE ARTS

46. Prosody in automatic speech processing 633
 ANTON BATLINER AND BERND MÖBIUS
47. Automatic prosody labelling and assessment 646
 ANDREW ROSENBERG AND MARK HASEGAWA-JOHNSON
48. Stress, meter, and text-setting 657
 PAUL KIPARSKY
49. Tone-melody matching in tone-language singing 676
 D. ROBERT LADD AND JAMES KIRBY
- References* 689
Index of Languages 877
Subject Index 887

focuses on various prosodic aspects of Estonian including the phonetics and phonology of intonation, rhythm, stress, and quantity. She is also interested in prosodic and segmental features of Estonian Swedish in comparison with other varieties of Swedish.

Brett Baker is an Associate Professor in Linguistics at the School of Languages and Linguistics, University of Melbourne. His primary research areas are phonology and morphology, with a focus on Australian Indigenous languages including Kriol. He has worked on a number of languages of southeastern Arnhem Land, especially Ngalakgan and Nunggubuyu/Wubuy, through primary fieldwork since the mid-1990s. His current work takes an experimental approach to investigating the extent to which speakers of Wubuy have knowledge of the internal structure of polysynthetic words.

Mary Baltazani is a researcher at the Phonetics Laboratory, University of Oxford. Her research focuses on phonetics, phonology, and their interface, with special interests in intonation and pragmatics, Greek dialects, dialectology, and sociophonetics. She is currently investigating the diachronic development of intonation as it has been shaped by the historical contact of Greek with Italian and Turkish in a project supported by the Economic and Social Research Council, UK.

Jonathan Barnes is an Associate Professor in the Boston University Department of Linguistics. He received his PhD from the University of California, Berkeley, in 2002, and specializes in the interface between phonetics and phonology, most particularly as this concerns the structures of tone and intonation systems. Much of his recent work involves dynamic interactions in perception between ostensibly distinct aspects of the acoustic signal, and the consequences of these interactions for our understanding of the content of phonological representations.

Anton Batliner is Senior Research Fellow affiliated with the chair of Embedded Intelligence for Health Care and Wellbeing at the University of Augsburg. He obtained his PhD at LMU Munich in 1978. He has published widely on prosody and paralinguistics and coauthored *Computational Paralinguistics* (Wiley, 2014, with Björn Schuller), besides being an active editor and conference organizer. His earlier affiliations were with the Pattern Recognition Lab at the University of Erlangen-Nuremberg and the institutes for Nordic Languages and German Philology (both LMU Munich).

Ryan Bennett is an Associate Professor in the Department of Linguistics at the University of California, Santa Cruz. His primary research area is phonology, with a particular emphasis on prosody and the interfaces between phonology and other grammatical domains (phonetics, morphology, and syntax). His current research focuses on the phonetics and phonology of K'ichean-branch Mayan languages, particularly Kaqchikel and Uspanteko. This work involves ongoing, original fieldwork in Guatemala and draws on data from elicitation, experimentation, and corpora. He also has expertise in Celtic languages, especially Irish.

Štefan Beňuš is an Associate Professor in the Department of English and American Studies at Constantine the Philosopher University and a Senior Researcher in Speech Sciences at

the Institute of Informatics of the Slovak Academy of Sciences in Bratislava. He holds a PhD in linguistics from New York University and postdoctoral qualifications from Columbia University and LMU Munich. His research centres on the relationship between (i) speech prosody and the pragmatic/discourse aspect of the message and (ii) phonetics and phonology, with a special interest in the articulatory characteristics of speech. He previously served as an associate editor of *Laboratory Phonology* and regularly presents at major conferences, such as Speech Prosody and Interspeech.

Heather Bortfeld is a Professor of Psychological Sciences at the University of California, Merced (UC Merced). She completed her PhD in experimental psychology at the State University of New York, Stony Brook, in 1998. Her postdoctoral training in cognitive and linguistic sciences at Brown University was supported by the National Institutes of Health. She was on the psychology faculty at Texas A&M University and the University of Connecticut prior to arriving at UC Merced in 2015. Her research focuses on how typically developing infants come to recognize words in fluent speech and the extent to which the perceptual abilities underlying this learning process are specific to language. She has more recently extended this focus to the influence of perceptual, cognitive, and social factors on language development in paediatric cochlear implant users.

Bettina Braun is Professor of General Linguistics and Phonetics at the University of Konstanz. Her research focuses on the question of how listeners process and interpret the continuous speech stream, with a special emphasis on speech prosody. Further research interests include first and second language acquisition of prosody, and the interaction between prosody and other aspects of language (word order, particles).

Marc Brunelle joined the Department of Linguistics at the University of Ottawa, where he is now Associate Professor, in 2006. He obtained his PhD at Cornell University in 2005. His research interests include phonology and phonetics, tone and phonation, prosody, language contact, South East Asian linguistics, and the linguistic history of South East Asia. His work focuses on Chamic languages and Vietnamese.

Gabriela Caballero is an Associate Professor in the Department of Linguistics at the University of California, San Diego. She received her BS from the University of Sonora in 2002 and her PhD from the University of California, Berkeley, in 2008. Her research focuses on the description and documentation of indigenous languages of the Americas (especially Uto-Aztecan languages), phonology, morphology, and their interaction. Her research interests recently extend to the psycholinguistic investigation of phonological and morphological processing in order to better understand patterns of morphological and phonological variation in morphologically complex languages and prosodic typology.

Sasha Calhoun is a Senior Lecturer in Linguistics at Victoria University of Wellington. Her research focuses on the functions of prosody and intonation, in particular information structure. Her PhD thesis, completed at the University of Edinburgh, looked at how prosody signals information structure in English from a probabilistic perspective. More recently, she has extended this work to look at how information structure, prosody, and